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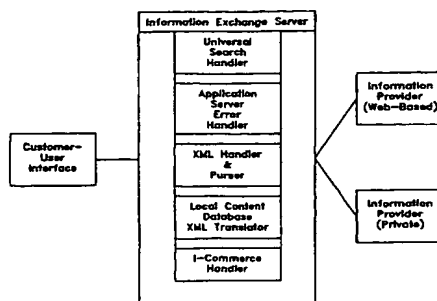


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- (54) Title: **SYSTEM AND METHOD FOR CONDUCTING AND COORDINATING SEARCH QUERIES OVER INFORMATION EXCHANGE NETWORKS AND PRIVATE DATABASES**
- (57) Abstract: A system and method for conducting and coordinating search queries over information exchange networks, such as the Internet, and in particular, the invention provides a system and method for a consumer-user to submit a search query to a single information exchange server to obtain information from a plurality of the databases of information providers.
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# SYSTEM AND METHOD FOR CONDUCTING AND COORDINATING SEARCH QUERIES OVER INFORMATION EXCHANGE NETWORKS AND PRIVATE DATABASES

This application claims priority to U.S. Provisional Application No. 60/141,660, filed June 30, 1999.

## Technical Field of the Invention

The present invention relates generally to a system and method for conducting and coordinating search queries over information exchange networks, such as the Internet, and in particular, the invention provides a system and method for a consumer-user to submit a search query to a single information exchange server to obtain information from a plurality of the databases of information providers.

## Background of the Invention

In the recent decade, there has been an explosion of information publicly available over information exchange networks, such as the Internet. This ever-increasing multitude of information publicly available makes the information more inaccessible. The information is more inaccessible because the increasing number of search engines, search programs and search services requires a consumer-user to use the search engines, search programs and search services one by one. As these engines, programs and services have search query protocols that vary from one another or are inconsistent with each other, the consumer-user is required to attempt to methodically submit and manage the user's own search queries and manage and coordinate the often redundant search results.

Due to the inherent difficulties of accessing information from the diverse array of the databases of web-based and private providers, there is a need for systems and methods of conducting and coordinating search queries which will allow a consumer-user to submit a query over a single information exchange server to obtain information from a plurality of the databases information providers such as the databases of web-based and private providers. The present invention provides such a system and method of conducting and coordinating search queries which is disclosed hereinbelow.

Search technologies often take a literal query and simply submit it to multiple engines in the same form, surrounding that term with a known tag (e.g. search on company "x" leads to query #1 of "company = x" and query #2 of "co = x"); no manipulation is done of the

query, term itself. Search technologies will also do simple lookups on an entered term (e.g. a query of "WCII" is compared to lists such as a ticker symbol list; if a match occurs then company-related results are displayed). Other search technologies rely on the user to specify the type of query, source, etc., prior to searching (e.g. a user must explicitly state that "x" is a company that results from "newswires" are desired in order to get effective results).

Current invention is more sophisticated: user need not specify what type of search is being conducted; liter and partial matches and system logic determine what gets displayed, using the taxonomy as the underpinning for much of the logic.

### Summary of the Invention

The present invention relates generally to a system and method for conducting and coordinating search queries over information exchange networks, such as the Internet, for information contained in the databases of information providers which information providers include web-based providers and private providers. In particular, the invention provides a system and method for a consumer-user to submit a search query to a single information exchange server to obtain information from a plurality of the databases of information providers which includes the database of the information exchange server.

The invention also relates to a search query protocol that is based on subject matter groupings that are placed in a data structure in which the subject matter groupings may be arranged in a hierarchical scale of importance. A search query protocol utilizing a hierarchical scale data structure allows one to obtain search query results which are weighted according to importance of particular subject matter groupings. For example, a hierarchical scale placing business events and business functions subject matter groupings higher will provide search results which are more relevant and useful to businesses and professionals.

The invention also relates to a method of creating a search query protocol which utilizes a data structure which may or may not utilize a hierarchical scale of subject matter groupings. In particular, the invention provides a mapping process which identifies and matches related terms or concepts or both to (1) expand a subject matter group already present in the data structure, (2) create new subject matter groups and place such groups within an existing data structure, or (3) create new subject matter groups and arrange a new data structure.

The invention relates to a system and method for translating a consumer-user's search query into search queries appropriate for various search engines, search programs and search services. Additionally, the invention provides a system and method of coordinating and

submitting, on behalf of the consumer-user, such translated search queries to a plurality of information exchange networks and private databases which utilize the various search engines, search programs and search services. The invention also provides a system and method for organizing and providing the consumer-user the search results from the translated search queries of the plurality of information exchange networks and private databases in a meaningful and non-redundant form.

The invention also relates to a system and method of expanding a consumer-user's single search query into additional search queries that are permutations of the consumer-user's original search query. Some permutations will contain a variety of synonyms, homonyms and related terms to the terms of the original search request. These search query permutations broaden the scope of the consumer-user's search query so the results obtained are not specifically limited to the original search query and yet return results that are still relevant and useful to the consumer-user. Expansion of the original search query terms by permutation may occur (1) prior to the assignment of the search query terms to the subject matter groupings in the data structure, (2) concurrent with the assignment of the search query terms to the subject matter groupings in the data structure, or (3) after the search query terms have been assigned to the subject matter groupings in the data structure. In addition, a combination of the above scenarios can take place, such as when a query generates several additional one prior to assignment within the data structure followed by the data structure itself appending additional terms to a query (e.g. a search on "cars" will spawn a search that also includes "automobiles").

The invention also provides a unique consumer-user interface for submitting a search query. The interface not only allows a consumer-user to submit a traditional search query, *i.e.* a linguistic query, but the interface also allows the consumer-user to submit a search query that is visually and conceptually based. For example, the interface may provide "concept keys" that visually represent or conceptually represent or both visually and conceptually represent the information to be searched for and obtained.

The visual representation may be done by providing icons or pictures on selectable keys wherein the icons or pictures are related to the information to be searched for and obtained. Likewise, the conceptual representation may be done by providing words or phrases on selectable keys wherein the words and phrases are related to the information to be searched for and obtained. The concept keys may provide secondary concept keys which further narrow the scope of the information to be searched for and obtained. The order in

which the consumer-user selects the concept keys may order the relative importance of the information to be searched for and obtained.

In another embodiment, the order of the selection of the concept keys may designate or create a data structure hierarchical scale to be used. Alternatively, the order of selecting the concept keys need not designate the relative importance of the information to be searched for and obtained and assignment of the search query terms to the data structure may be performed similar to the search query protocol for traditional linguistic search queries.

In an alternative embodiment, a consumer-user may select a power key to submit a predefined search query. The power search key allows a consumer-user to search for and obtain all the available information of a single term entered from selected or predefined databases. The single term may include the name of a person, a keyword, the name of a company. The information retrieved will be presented in formatted "instant views" which are based on the databases searched.

The invention also relates to a method and system for indexing the database of an information provider in order to correspond to the data structure of an information exchange server and enhance the retrieval of relevant information. Indexing occurs by categorizing the information contained in the database of the information provider into data-pools which correspond to the subject matter groupings of the information exchange server. These data-pools are then mapped or linked to the subject matter groupings.

Consequently, the data-pools are functionally related to the subject matter groupings. This functional relationship, i.e., "mapping", allows an information exchange server to collaborate with various information providers utilizing different methods of categorizing their databases to consistently retrieve relevant and meaningful information. Accordingly, this functionality gives the entire database collection one "language" for interpretation of the data, e.g., database #1 refers to "construction" as a subject, whereas database #2 refers to "housing projects". Without mapping the "construction" and "housing projects" databases to the same term, searches for construction-related topics would not retrieve any housing projects articles. There can be many ways of accomplishing this mapping. For example, a manual/intellectual process whereby a person compares the subject-matter content different databases.

Another example would be the employment of a programmed set of rules, which could further utilize a dictionary of synonyms, homonyms, phrases and related terms, in the form of software which can scan the various database items. Those same items can be categorized into a single language. A sample set of documents can be scanned and analyzed

for patterns, subject-matters, formats, etc., that are then applied to all documents, e.g., a set of 50 documents relating to "construction" are analyzed by the software which subsequently identifies other documents that relate to "construction".

#### Brief Description of the Drawings

Figure 1 is a block diagram illustrating the functional elements of the present invention.

Figure 2 is a block diagram illustrating the flow of information between the information exchange server and various connected information providers.

Figure 3 illustrates the process flow for the query request among connected information providers.

Figure 4 illustrates an embodiment of a consumer user interface browser screen.

Figure 5 is a block diagram illustrating the logical process flow of the query and response of an embodiment of the present invention.

Figure 6 is a flowchart diagram illustrating an embodiment of a keyword search.

Figure 7 is a flowchart diagram illustrating an embodiment of a person search.

Figure 8 is a flowchart diagram illustrating an embodiment of a company search.

Figure 9 is a flowchart diagram illustrating an embodiment of a quick keyword search.

Figure 10 is a flowchart diagram illustrating an embodiment of a quick person search.

Figure 11 is a flowchart diagram illustrating an embodiment of the viewing/purchasing of media content articles.

Figure 12 is a flowchart diagram illustrating an embodiment of a power web-based Internet search.

Figure 13 is a flowchart diagram illustrating an embodiment of a quick company search for public company profile information.

Figure 14 is a flowchart diagram illustrating an embodiment of a quick company search for private company profile information.

Figure 15 is a flowchart diagram illustrating an embodiment of an advanced company search. This is similar to the company search, however, the consumer-user may qualify the search by entering city, state and may select to see the specified type of data.

Figure 16 illustrates an embodiment of a consumer-user interface browser screen displaying the results of a person search. It shows all the initial matches for a person search; selecting one of those name then brings up the full results (news, journals, etc.) for that person.

Figure 17 illustrates and embodiment of a consumer-user interface browser screen displaying the results of a company search in list format.

Figure 18 illustrates and embodiment of a consumer-user interface browser screen displaying the results of a public company search. The HTML report may contain one of more of the sample content types listed on the left in the pulldown menu and may contain additional information.

Figure 19 illustrates and embodiment of a consumer-user interface browser screen displaying the results of a private company search. This is similar to Figure 18 but includes different data elements in the HTML report pulldown menu as different types of information exists for a private company versus a public company.

### Detailed Description of the Invention

The present invention provides a system and method for a consumer-user to submit a search query over an information exchange network to a single information exchange server to obtain information from a plurality of the databases of information providers which information providers include web-based and private providers and the information exchange server itself. The information exchange network may be the Internet.

Figure 1 is a block diagram illustrating the functional elements of the present invention. It depicts the logical server components that handle the input of a consumer-user query and the output results from that query (universal search handler). The parser handles the query translation to send to the information provider and parses the results. A separate translator is used for the local content and a separate handler is used to process the billable events and interact with the accounting/billing system, e.g., the I-commerce handler.

Figure 2 is a block diagram illustrating the flow of information between the information exchange server and various connected information providers. It illustrates that there can be n number of information providers, each of which can involve different parsing and handling rules within the information exchange server. The flow includes the possibility that information providers may interact with one another and may serially pass queries/information among themselves.

### Example 1

#### Search Query Submittal

A consumer-user may submit a traditional linguistic search query by entering the terms via the consumer-user interface. The terms entered are those that reflect the consumer-

user's information need. For example, the queries can be a simple request for "Doe" regardless of whether that is a person, company, object or subject. Alternatively, these queries can range in complexity, such as "((advertising and "direct marketing") not online) and "new york". For example, if a consumer-user would like information on upcoming business events of Acme, Inc., the consumer-user would enter "Acme and upcoming business events".

A consumer-user may also submit a conceptual search query by utilizing the concept keys of the consumer-user interface. Here, a consumer-user would select the key which has a visual or conceptual representation of the information to be searched for and obtained. For example, if a consumer-user wanted information on the upcoming business events of businesses which deal in goods related to computers, the consumer-user would select a concept key having a picture of a calendar, a concept key having "Co.", and a concept key having a picture of a computer.

Additionally, a consumer-user may have the option of submitting a predefined search query by selecting either a power search or a quick search key. The power search key allows a consumer-user to search for and obtain information from predefined categories such as people, companies, and stocks or predefined data-pools or databases such as all databases, news related databases, professional journals, the Internet, and the database of the information exchange server. The quick search key provides a search that allows a consumer-user to enter a simple word or phrase, without categories or qualifications being specified or with simple categories chosen such as 'company' or 'person'. The simplicity of this search is what principally distinguishes it from the power search, as well as the fact that the quick search relies on system logic rather than user-defined preferences to determine the relevant results to display.

For example, if a consumer-user would like all available information concerning the product "gizmo", the consumer-user would enter the keyword "gizmo" and select the "power key" on the consumer-user interface. The consumer-user would then select the relevant industries. Then the consumer-user would define the scope of the search by selecting, from a pull-down menu, the appropriate key which designates that the search is to be of all available resources, news related databases, professional journals, the Internet or the information exchange server itself. If the consumer-user designates that the scope of the search is to be professional journals, the information retrieved and presented to the consumer-user is formatted into an appropriate "instant view" which would be a set of documents categorized into views, such as 'person', 'industry' and geography' so that the selection of any of those



views would organize the results into those views broken down into categories within those views (e.g. selecting geography would provide the list of documents arranged by cities/countries/regions.) Figure 6 illustrates the process flow when a keyword search is performed.

As another example, a consumer-user may select a predefined power people search key. Figure 7 illustrates the process flow of such a person request.

Other examples include a company search and Internet site searches. Figures 8 and 12 illustrate the process flow of such search requests.

In terms of the quick search functionality, the consumer-user interface is utilized to perform a such search based upon, but not limited to, keywords, persons, companies and Internet sites. Examples of various displayed results embodiments are illustrated in Figures 9, 10, 12, 13 and 14.

### Example 2

#### Data Structure and Subject Matter Groupings

The data structure is comprised of subject matter groupings. These subject matter groupings of the data structure may be arranged on a hierarchical scale. For example, a business related data structure would comprise the following subject matter groupings:

```
<Terms n="00743">  
<T>Space Planning</T>  
<TT>Industry Focus</TT>  
<BT>Architecture/Design</BT>  
</Terms>
```

```
<Terms n="00744">  
<T>Hair, nail and skin services</T>  
<TT>Industry Focus</TT>  
<BT>Personal care services</BT>  
</Terms>
```

```
<Terms n="00745">  
<T>Barber shops and beauty salons</T>  
<TT>Industry Focus</TT>
```

<BT>Personal care services</BT>

</Terms>

<Terms n="00746">

<T>Forensic biotechnology</T>

<TT>Industry Focus</TT>

<BT>Biotechnology</BT>

</Terms>

<Terms n="00747">

<T>Diet centers</T>

<TT>Industry Focus</TT>

<BT>Personal care services</BT>

</Terms>

<Terms n="00748">

<T>Clinical biotechnology</T>

<TT>Industry Focus</TT>

<BT>Biotechnology</BT>

</Terms>

<Terms n="00749">

<T>Pharmaceutical biotechnology</T>

<TT>Industry Focus</TT>

<BT>Biotechnology</BT>

</Terms>

<Terms n="00750">

<T>Agricultural biotechnology</T>

<TT>Industry Focus</TT>

<BT>Biotechnology</BT>

</Terms>

<Terms n="00751">

<T>Industrial biotechnology</T>  
<TT>Industry Focus</TT>  
<BT>Biotechnology</BT>  
</Terms>

<Terms n="00752">  
<T>Notary services</T>  
<TT>Industry Focus</TT>  
<BT>Legal Services</BT>  
</Terms>

<Terms n="00753">  
<T>Product inventors (Biotechnology)</T>  
<TT>Industry Focus</TT>  
<BT>Biotechnology</BT>  
</Terms>

<Terms n="00754">  
<T>Paralegal services</T>  
<TT>Industry Focus</TT>  
<BT>Legal Services</BT>  
</Terms>

<Terms n="00755">  
<T>Research biotechnology</T>  
<TT>Industry Focus</TT>  
<BT>Biotechnology</BT>  
</Terms>

<Terms n="00756">  
<T>Higher education finance</T>  
<TT>Industry Focus</TT>  
<BT>Educational finance</BT>  
<NT>Student loans</NT>

</Terms>

<Terms n="00757">

<T>Academic biotechnology</T>

<TT>Industry Focus</TT>

<BT>Biotechnology</BT>

</Terms>

<Terms n="00758">

<T>Corporate</T>

<TT>Industry Focus</TT>

<BT>Philanthropic organizations</BT>

</Terms>

<Terms n="00759">

<T>Private</T>

<TT>Industry Focus</TT>

<BT>Philanthropic organizations</BT>

</Terms>

<Terms n="00760">

<T>Executive bodies</T>

<TT>Industry Focus</TT>

<BT>General administration</BT>

</Terms>

<Terms n="00761">

<T>Legislative bodies (General administration)</T>

<TT>Industry Focus</TT>

<BT>General administration</BT>

</Terms>

Or depicted a different way:

Industries

Biotechnology

- Academic biotechnology
- Agricultural biotechnology
- Clinical biotechnology
- Forensic biotechnology
- Industrial biotechnology
- Pharmaceutical biotechnology
- Product inventors (Biotechnology)
- Research biotechnology

Computers/Internet

Computing

Hardware

- Personal and home (Computer hardware)
- Business (Computer hardware)

Software

- Personal and home (Computer software)
- Business (Computer software)

Information services (Computing and Information technology)

Help desk

Internet services

- Internet Access Providers
- E-Mail providers
- Internet Service Providers
- Internet broadcasting
- Online services (Internet services)
  - Web design
  - Internet communities
  - E-Business
  - E-Commerce
  - Web hosting
- Value-added resellers

Intranet services

Networking

- Local Area Networking (LAN)

## Wide Area Networking (WAN)

Database design and maintenance

Data mining

Database architecture

Telecommunications

Cellular

Wireless

## Education

Distance learning

K-12

Higher education

Colleges and universities (Industries)

Junior colleges (Higher education)

Technical and trade schools

Business and secretarial

Computer training

Educational administration

Educational technology industry

Computer-based instruction

Internet-based instruction

Educational finance

Higher education finance

Student loans

Collections

Financing (Student loans)

Underwriting

Educational media (Educational services)

Pre-school education

## Environmental services

Air purification

Mineral exploration and mining

Waste collection

Solid waste collection

Hazardous waste collection

Wastewater Treatment  
Waste treatment and disposal  
Solid waste treatment and disposal  
Hazardous waste treatment and disposal  
Groundwater Treatment  
Remediation services

A search query protocol utilizing a hierarchical scale data structure allows one to obtain search query results which are weighted according to importance of particular subject matter groupings. For example, a business related hierarchical scale may place greater importance on business events and business functions subject matter groupings to provide search results which are more relevant and useful to businesses and professionals interested in business meetings and business social events rather than product information.

### Example 3

#### Search Query Expansion

A consumer-user's single search query may be expanded into additional search queries by creating permutations of the consumer-user's original search query. For example, a consumer-user when entering "cat" would permute to FIND "cat, feline, lion..." and also permute to FIND "company=cat" find person=cat find industry=cat.

Expansion of the original search query terms by permutation may occur (1) prior to the assignment of the search query terms to the subject matter groupings in the data structure, (2) concurrent with the assignment of the search query terms to the subject matter groupings in the data structure, or (3) after the search query terms have been assigned to the subject matter groupings in the data structure.

This expansion can occur at different points in the search flow depending upon where the permutation are desired.

Some permutations of the expanded queries can contain a variety of synonyms, homonyms and related terms derived from the terms of the original search request.

### Example 4

#### Search Query Translation

Search query translation allows a consumer-user's single search query to be automatically translated into multiple search queries appropriate for various search engines, search programs and search services to be submitted on behalf of the consumer-user. Information about the information provider search engines and programs are housed within the information exchange server. This information allows the information exchange server to identify what specific syntax the various information providers will accept, what information is contained in their databases, in what situations they are employed when a specific query is inputted by a consumer-user, etc. The information exchange server expands and/or edits the query according to this information so that the various search engines/programs will understand the query sent and will most optimally respond to that query.

The search query translation occurs by the search engine as depicted in Figure 5, ref. (4). For example, a query for the company ACME results in information provider #1 getting a permuted query for "ACME, New York, NY" and information provider #2 getting a query for "1763485" where that number represents ACME using the nomenclature that information provider #2 recognizes.

#### Example 5

##### Query and Response Messaging Within the Information Exchange Network

In the present invention, detailed request and response messaging is utilized. A search request is submitted by the information exchange server to a information provider. That single request, composed of multiple parameters, then spawns multiple queries, i.e., "expanded", to different indexes and sources that may be either local or remote (gatewayed to another system). The "expanded" search is then forwarded on to an information provider, wherein it is further parsed and the search is performed. The results set is compiled in and sent back to information exchange server. Then the information exchange server parses the results, which may be a combination of different full records, titles, links, and abstracts, and then forwards the results for display on the browser housed on the consumer-user's interface.

Figure 3 illustrates an embodiment wherein various information providers are connected to each other by gateways. The server can access the databases of information providers A, B, C and D through one of several gateways. For example, A can be accessed directly through gateway 1 or via the pathway: 3, 4. D cannot be directly accessed, i.e., gateways 2 and 5 must be used. Also, by accessing the database of C, the database of D may be automatically accessed or may be accessed upon a specific request.



Figure 5 illustrates an embodiment of a search method of the present invention. The browser interface accepts the search parameters submitted by the consumer user. The information exchange server receives the consumer-user's request and forwards it to the application server of the application server. The search handler interprets the consumer's search parameters and generates an XML query string. The information provider then performs the search across multiple data sources. The search results are then aggregated into a single XML document. The XML document is then forwarded back to the information exchange server's search handler which then receives the response, validates the XML and performs an XML to HTML conversion via XSL. From a user perspective the document is transformed into a formatted readily understandable page.

More specifically, the following occurs from the initial search request to the search results, as illustrated in Figure 5. The web browser initiates an HTTP request, and sends any relevant search parameters at (1). The web server receives the web request, and forwards it to the application server at (2). The application server extracts the search parameters, and creates an XML document which describes the search criteria. The application server forwards this search criteria to the core search engine at (3). The search engine then aggregates data from multiple data sources. It does this, for example, by spawning multiple threads of execution. Each thread is tasked with connecting with a separate data source. For example, one thread connects to a ticker server and a second thread connects to a web search server at (4). The search engine gathers results and creates a unified XML document or a series of XML documents. This document(s) is validated in order to make sure that it adheres to specific data standards. The XML is then converted into HTML via the XML Styling Language (XSL) at (5). An HTML page of the completed results is returned to the web browser at (6).

The system of the present invention includes various subsystems which enable the foregoing functionalities. The information exchange server houses the universal search handler which is responsible for dispatching the computer-user's search queries to the information provider. This subsystem is responsible for dispatching queries, posts, fetches and buys to the Information provider. 'Post' occurs when the information exchange server sends information to the information provider for storage and latter searching. 'Fetch' is the submittal of a query, along with the retrieval of the results from the information provider, which may be a request for a known or unknown document. "Buy" exchanges purchase information as part of the exchange with the information provider. It also passes system

generated fatal error condition messages to the information exchange server, where such errors will appended to the error log.

Specifically, the consumer-user's browser passes all universal search requests, while also receiving the search result, as an HTML file, for example. The application server error handler, monitors and coordinates process errors that occur within the application server. The present invention's script language handler and parser creates a query file, validates the response, and provides the script language to consumer-user interface viewable transformation. An example of such transformation includes, but not be limited to XML to HTML format.

The information provider receives the search request and executes the search. The performed search is of databases which may be internal or external to the information provider. Therefore, a first information provider may be linked to a second information provider, and so on. The information provider may also host references to the information content of the information exchange server itself, i.e., information exchange server database.

The information exchange server may house a local information exchange server database. Alternatively, the information exchange server may house a plurality of at least one applications server and a database. The applications server can be a Internet server.

Additionally, the local exchange server posts local database content to the information provider on a regular basis. In order for the information provider search engine to perform a universal search for both its own content and the content owned by information exchange server, the Universal search handler posts all information exchange server content to Information provider. Further, the server includes a script language translator, which performs the appropriate format conversion of the local content into a form for transmission to and receipt by the information provider. A translator that could perform such conversion in XML is one example.

The information exchange server may also contain an information-commerce handler, which coordinates and manages consumer-user requests for database content that is fee-based. The information-commerce handler also manages transaction flow and delivery of the requested information to the customer-user.

The search handler functions as the central coordinator for all searches forwarded to the information provider. Specifically, the handler performs the following types of exchanges, for example:

Property	Type	Description
Host Name	String	Host Name of Information provider Server
CGI Get File	String	Name of Information provider File/Executable responsible for receiving XML queries.
Port Number	Integer	Host Port Number of Information provider Server
XML Request Query	String	XML Request Query
XML Response	String	XML Response from Information provider

The handler receives the consumer-user's query, which has undergone a mapping and/or "expansion" in accordance with the data structure. The handler then generates an XML query request in the form of an XML query string. The query will adhere to the data document format of the information provider, such as Document Type Definition (DTD.)

The handler executes the search by dispatching the XML request query to the information provider server.

Upon the receipt of the XML response from the information provider, the handler stores the response XML packet. The handler stores the XML request prior to its forwarding. The handler retains knowledge of what was sent to the information provider. The response from the information provider is then intended to match initial expectation.

The search results are returned in XML format from the information provider.

The information-commerce handler sets the XML response. The handler first retrieves the XML results, modifies those results, for example, by adding price tags) and resets the XML results. The handler then automatically retrieves the HTML page of the newly revised XML document. Thus, the search results are formatted into HTML. This transformation from XML to HTML can occur via a XSL style sheet. XSL is "extensible style language" a W3C standard. The style sheets describe how documents are presented on screens, in print, or in any medium. By attaching style sheets to structured documents on the Web (e.g. HTML), authors and readers can influence the presentation of documents.

An example of the style sheet is listed below:

Property	Type / Parameter	Description
XSL Style Sheet	String	Style Sheet responsible for transforming XML to HTML.

Below is the Java interface for the Search handler. It illustrates the primary Application Programming Interface (API) into the Search engine.

```
import java.util.*;

/**
 * Serves as the central coordinator for searching via Information provider
 */
public class SearchHandler {

    /**
     * Constructor
     */
    public Search ()

    /**
     * Get Methods
     */
    public String getHost();
    public String getCGIFile();
    public int getPort();

    /**
     * Set Methods
     */
    public void setHost();
    public void setCGIFile();
    public void setPort();

    /**
     * Sends Search request to Information provider
     */
    public void executeSearch (HashTable hash) throws
        InvalidQueryParametersException,
        UnknownServiceProviderException,
        InvalidSearchResultsException,
        IOException

    /**
     * Turns validation on/off
     * By default, validation is set to true.
     * If true, XMLResponse will be validated against
     * its own DTD during the executeSearch method.
     */
    public void setAutoValidation (boolean value);

    /**
     * Get XML Response from Information provider
     */
    public String getXMLResponse();
    public void setXMLResponse();

    /**
     * Get HTML Response from Information provider
     * Transform XML to HTML via designated XSL StyleSheet
     */
    public String getHTMLResponse (String xsl) throws InvalidXSLException;

    /**
     * Get HTML Response from Information provider
     * Method will automatically pick an appropriate style
     */
}
```

```

    * sheet that matches the given XML data
    **/
    public String getHTMLResponse () throws InvalidXSLEException;
}

```

The XML handler and parser is responsible for generating, i.e., creating, the XML query strings which adhere to the information provider DTD. Also the handler and parser connects to the information provider server and forwards an XML query string and returns the XML response. In addition, the handler and parser transforms the XML to HTML via a specified stylesheet. The handler and parser can be a part of the same system. The parser's function is to look for specific strings in the XML that are cues for specific action. The handler performs all other functions, while managing the full XML process, such as error checks, logic for determining actions, etc.

A descriptive example of an XML query/post string which adheres to the Information provider DTD is as follows:

Property	Type	Description
Query Parameters	HashTable	A HashTable that contains all query parameter name-value pairs
XMLQuery	String	XMLQuery String

#### Task: Generate XMLQuery

Based on a hash table of name-value pairs, create an XML query string which adheres to the information provider DTD.

The handler/parser also generates an XML content posting file which adheres to the information provider DTD.

Below is the Java Interface for the XMLQuery object. This object is responsible for gathering the search criteria and generating an XMLDocument based on these criteria.

```

/**
 * Based on Servlet Input Parameters, this class generators
 * an XML Query packet adhering to the Information provider DTD
 **/

public class XMLQuery {
    private String params;
    private StringBuffer xmlquery;

    /**
     * Constructor receives a list of comma separated search parameters
     **/
    public XMLGenerator (HashTable hash) {
    }
}

```

```

/**
 * Returns XML Query Packet adhering to the Information provider DTD
 */
public String getXMLQuery () {
    return xmlquery.toString();
}
}

```

The handler/parser connects to the information provider, sends a query request, and captures/stores the response. The handler/parser encodes the XML query string into an appropriate text so that it may be transferred via HTTP to the information provider. The XML response is validated against its own DTD. Each XML for each information provider may have its own DTD.

Below is the Java interface for the XMLTransfer object. This generic object is responsible for five tasks: 1) connecting to any third party search system via the HTTP protocol; 2) sending the search query (usually in the form of an XML document); 3) gathering the search results; 4) validating the search results via an XML parsing engine; and 5) returning the XML document to other services within the search engine.

```

import java.net.*;
import java.io.*;

/**
 * Sends XML Query Request to Information provider Search Engine and
 * XML Parser: TBD. Possibilities include MS-XML, IBM, and XP
 */
public class XMLTransfer {
    private StringBuffer response;

    /**
     * Constructor opens connection to specified Host,
     * sends XML query and stores XML response
     */
    public XMLTransfer (String host, String file, int port)
        throws UnknownHostException, IOException {
    }

    /**
     * Connects to Information provider, returns XML Response
     */
    private String connect (String xmlquery) throws
        UnknownHostException, IOException {
    }

    /**
     * Encodes Query String in MIME Compliant Text
     */
    private String MIMEEncode (String text) {
    }

    private void validate() throws
        InvalidXMLResponseException{
    }
}

```

}

The data source handler/parser transforms XML to HTML based on designated style sheet. The XSL processor can include any commercially processor.

A descriptive example of an XML to HTML string is listed as follows:

Property	Type	Description
XSL Style Sheet	String	XSL Style Sheet
XML String	String	XML String

Below is the Java interface for the XML2HTML object. This object is responsible for transforming any XML document into HTML via XSL.

```

/**
 * Transforms XML document into HTML via XSL (XML Style Sheets)
 * XSL Processor: TBD. Possibilities include MS-XML and LotusXSL
 */
public class XML2HTML {
    private String xml;

    public XML2HTML (String xml) {}
    public String toHTML (String xsl) {}
}

```

### Example 6

#### Concept Key Search Query

A concept key search query may be performed by use of a consumer-user interface wherein selectable concept keys visually or conceptually represent the information to be search for and obtained. The visual or conceptual representation may be done by providing icons, pictures, words or phrases on selectable keys. The concept keys may provide secondary concept keys which further narrow the scope of the information to be searched for and obtained. For example, the consumer-user can select the "company" concept key and then refine to include the "New York" key.

Additionally, the order in which the consumer-user selects the concept keys may order the relative importance of the information to be searched for and obtained. For example, keys of "cat"; "leopard"; "meat" are utilized wherein the primary weight is given to the first term with declining degrees of importance to the next two, therefore, the results match "cat" and some results match "leopard". When the order is reversed, such as "meat";

“leopard”; “cat”, all results will match “meat”, but not as many will match “cat”, as compared to the prior example. Moreover, the phrase “cat leopard meat” will be utilized for exact matching, along of with word-order matching combinations which determine the ordering of results.

### Example 7

#### Indexing and Mapping Data-Pools to Data Structures

The databases of the information providers are categorized and indexed into data-pools. For example, these pools may include industries, job functions, geographic locations, stages of business, etc.

These data-pools are then mapped or linked to the subject matter groupings of the information exchange server. For example, “property and casualty insurance” and some of its related mappings (MT) for NAICS, D&B, RDS, IAC providers.

```
<Terms n="00808">
<T>Property and casualty insurance</T>
<TT>Industry Focus</TT>
<BT>Insurance industry</BT>
<SN></SN>
<EN></EN>
<MT source="NAICS Term">Direct Property and Casualty Insurance Carriers</MT>
<MT source="NAICS Code">524126</MT>
<MT source="RDS SIC Term">Fire, marine, and casualty insurance</MT>
<MT source="RDS SIC Code">633000</MT>
<MT source="DB SIC Code">6331</MT>
<MT source="DB SIC Code">6351</MT>
<MT source="DB SIC Term">Fire, Marine, and Casualty Insurance</MT>
<MT source="DB SIC Term">Surety Insurance</MT>
<MT source="IAC SIC Code">6412030</MT>
<MT source="IAC SIC Term">Product Liability Insurance</MT>
<MT source="IAC SIC Term">Property & Liability NEC</MT>
```

### Example 8

#### Business Search Query



Figure 9 illustrates an example of a prototypical business search. A user enters "Doe" and retrieves business-focused results. The results are for news, companies, people, etc., that match "Doe", but excludes pop culture, entertainment information, for example.

### Example 9

#### Educational Search Query with Concept Keys

A consumer-user interface may be specially created for educational search queries with concept keys. Such concept keys would include selectable keys which visually represent educational subjects such as math, art, music, science, languages, and reading. These keys may provide secondary concept keys. For example, selection of the math concept key may provide secondary keys which include further sub-categories such as addition, subtraction, multiplication, and division. By selecting a multiplication secondary key, a consumer-user may search for and obtain all information related to educational products such as software programs and games useful in learning how to multiply.

As another example, the music concept key could have secondary concept keys which include classical, baroque, romantic and jazz. By selecting the baroque concept key, a consumer-user could obtain information concerning baroque composers, baroque music scores and listen to sound bytes of baroque music.

For the children who are not yet fluent in verbal language, the concept keys could provide pictures of cartoon characters and educational games. By selecting a particular concept key, a child consumer-user would be able to easily obtain pictures, sound bytes and educational games without being limited by a language barrier.

Various preferred embodiments of the invention have now been described in fulfillment of the objects of the invention. While these embodiments have been set forth by way of example, various other embodiments and modifications will be apparent to those skilled in the art. Accordingly, it should be understood that the invention is not limited to such embodiment, but encompasses all that which is described in the following claims.

CLAIMS

What is claimed is:

1. A method for an information exchange server to conduct and coordinate a search query over an information exchange network for information included in a database of an information provider, comprising:
  - receiving a search query comprising search terms from a consumer-user;
  - translating the search query into a translated query;
  - submitting the translated query to the information provider;
  - receiving information from the information provider;
  - organizing and formatting the information received and
  - presenting the information to the consumer-user in an organized format.
2. The method of claim 1, further comprising assigning the search terms to a data structure.
3. The method of claim 1, further comprising expanding the search query into a plurality of search queries, wherein the plurality is translated into a plurality of translated queries which are submitted to the information provider.
4. The method of claim 1, wherein the information provider is at least one of the information exchange server, a web-based provider and a private provider.
5. The method of claim 1, wherein the data structure is comprised of subject matter groupings.
6. The method of claim 5, wherein the subject matter groupings are arranged in a hierarchical scale.

7. The method of claim 3, wherein expanding the search query comprises using synonyms, homonyms and related terms to the terms of the search query.

8. The method of claim 1, further comprising assigning the terms of the search query to the data structure.

9. The method of claim 8, wherein expanding the search query occurs before, concurrently with, or after assignment of the terms of the search query to the data structure.

10. The method of claim 1, further comprising providing the consumer-user with an interface which interface allows the consumer-user to submit a search query, said search query being text or visually and conceptual based.

11. The method of claim 10, wherein the interface comprises at least one of concept keys which visually represent, conceptually represent, and both visually and conceptually represent the information to be searched for and obtained.

12. The method of claim 11, wherein the order of selection of the concept keys by the consumer-user designates the hierarchical scale of the data structure.

13. The method of claim 11, wherein the concept keys contain icons, pictures, words or phrases which represent the information to be searched for and obtained.

14. The method of claim 10, wherein the interface comprises at least one of search keys to submit a predefined search query and to obtain search results in a formatted instant view.

15. A method of creating a data structure having subject matter groups, comprising:

indexing a database into data-pools;  
creating subject matter groups;  
mapping the data-pools to the subject matter groups;  
performing a first search query of the database;  
performing a second search query of the database by utilizing the subject matter groups;  
comparing the results of the first search query with the results of the second search query; and  
redefining the data-pools and the subject matter groups as based upon the comparison of the first and second search queries, or creating additional data-pools or subject matter groups as based upon the comparison of the first and second search queries.

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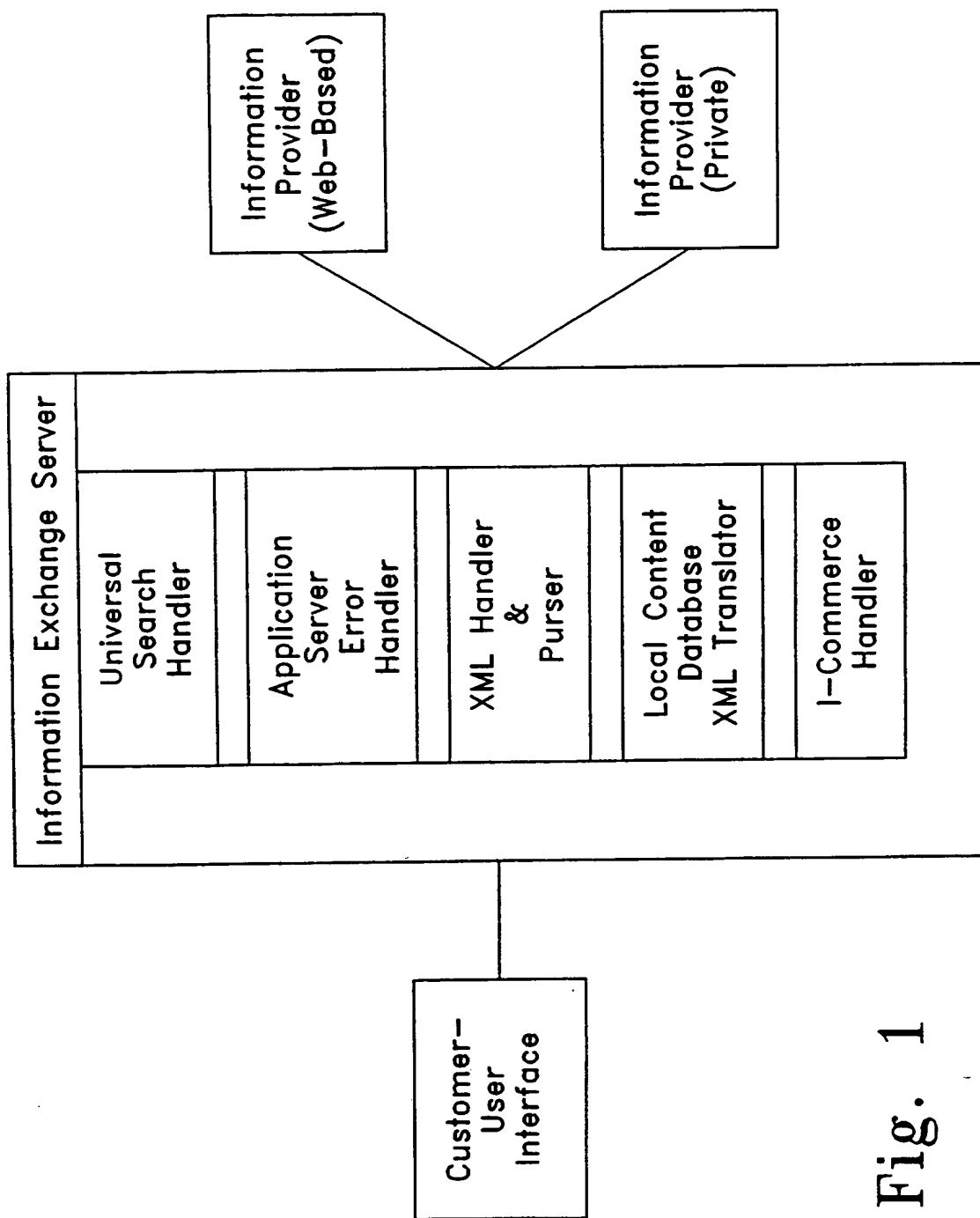


Fig. 1

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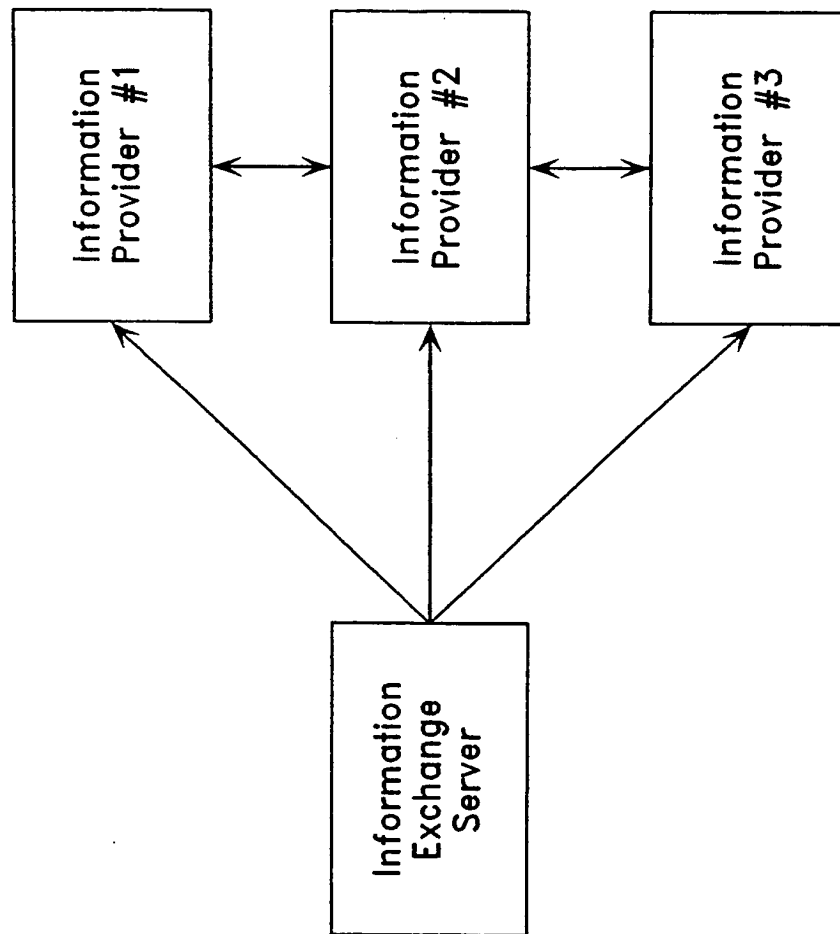


Fig. 2

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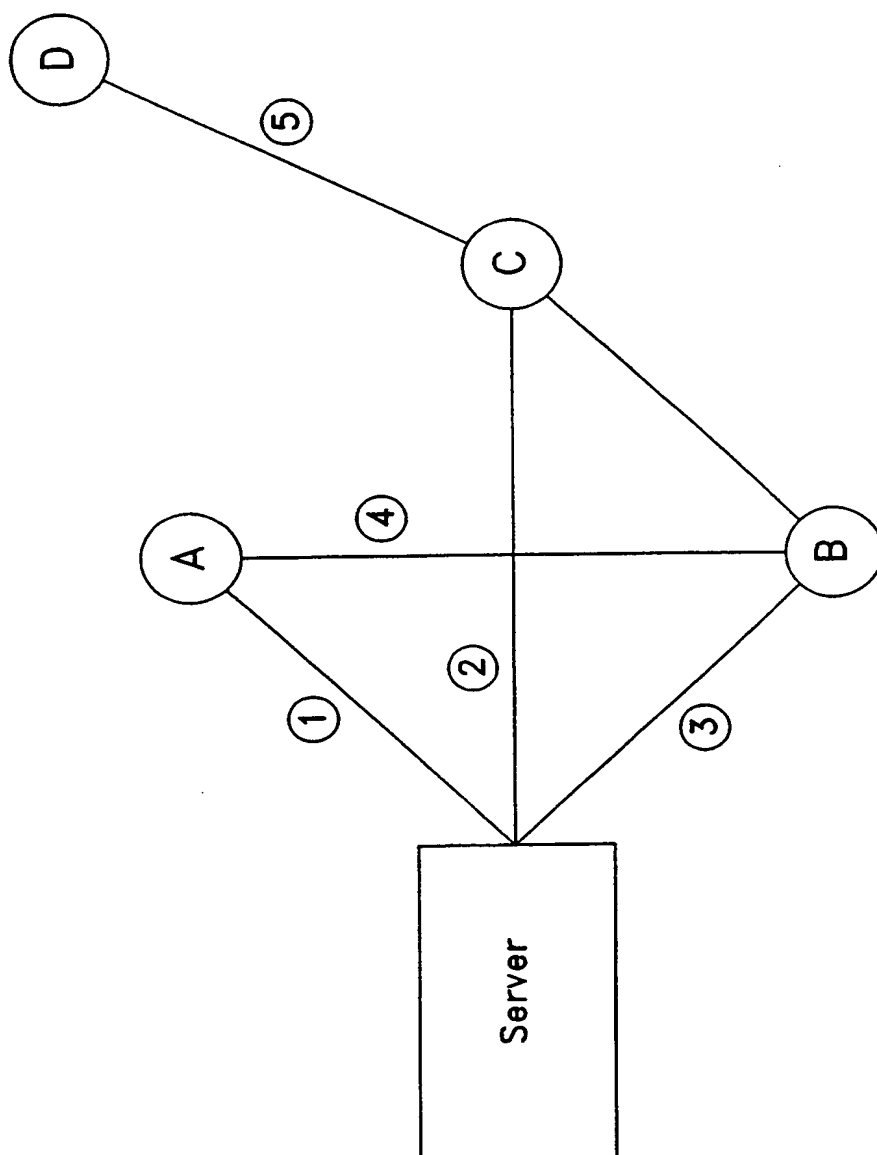


Fig. 3

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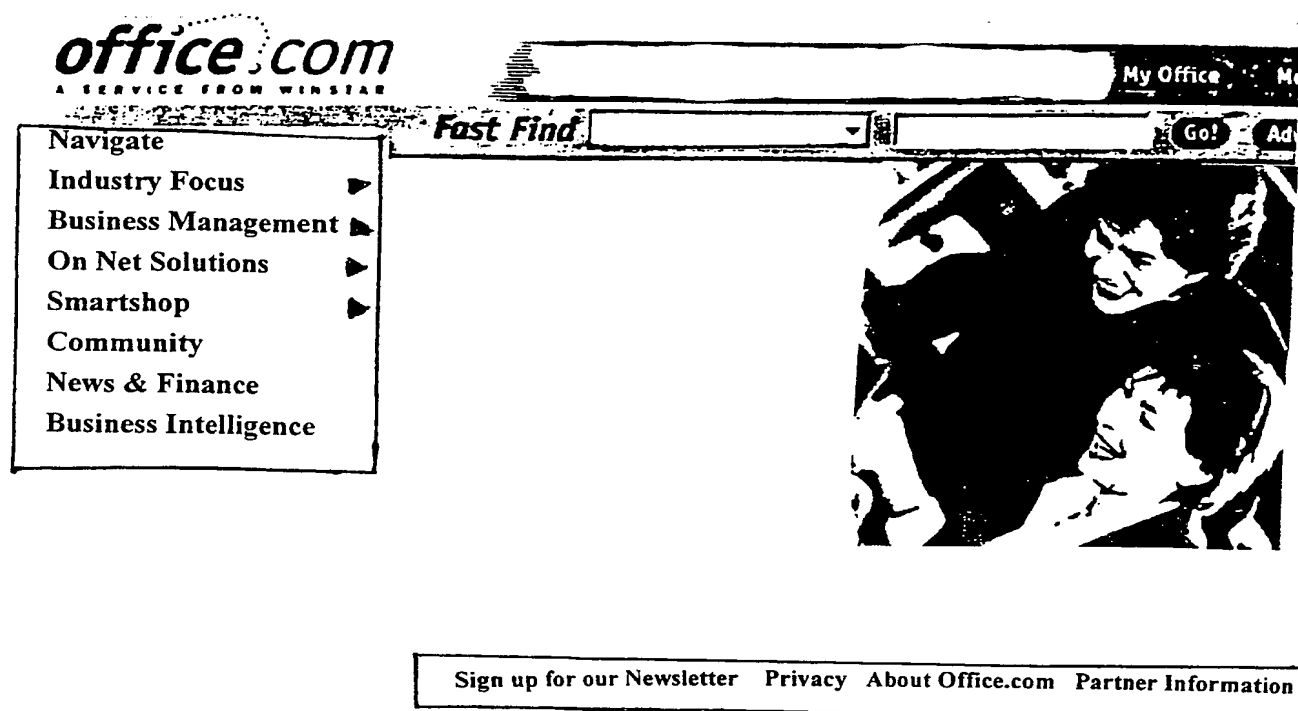


Fig. 4



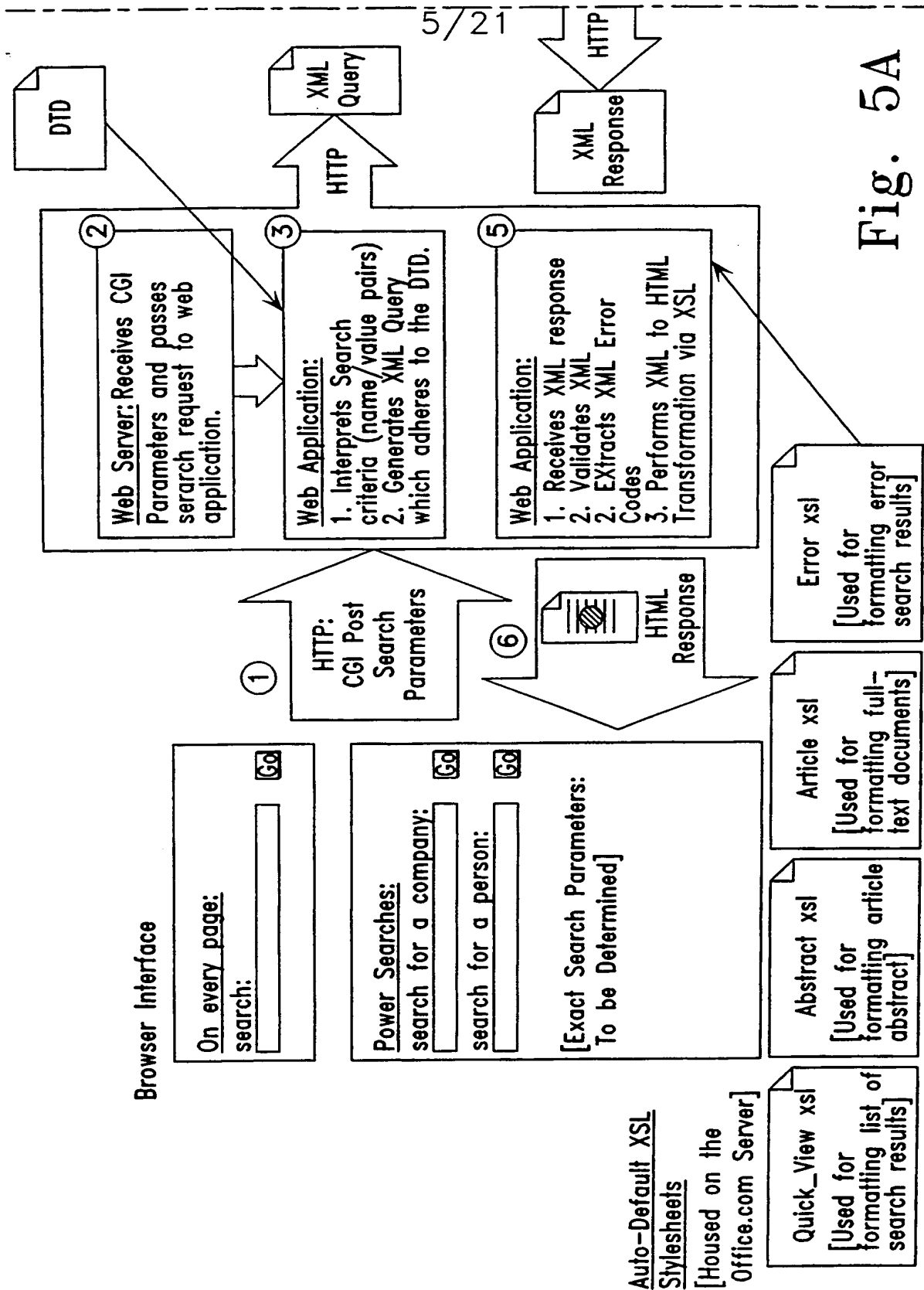


Fig. 5A

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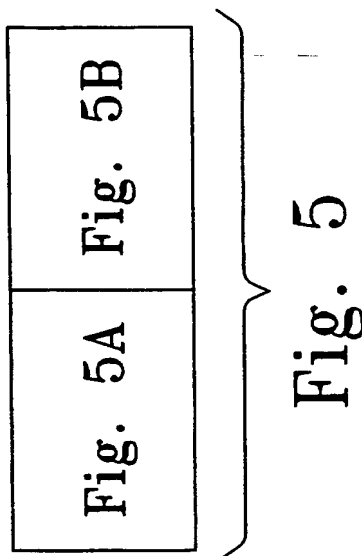
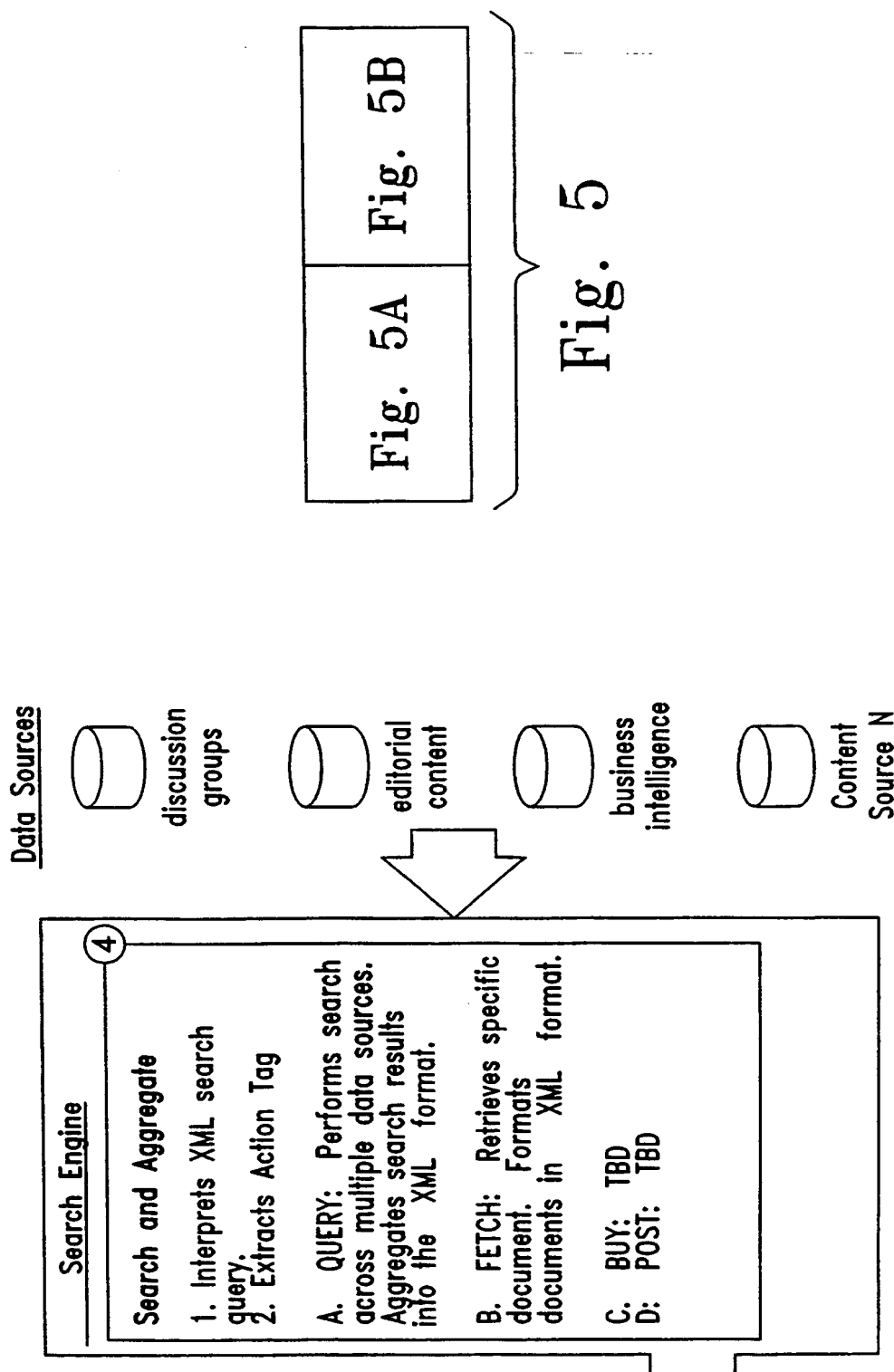


Fig. 5B

**SUBSTITUTE SHEET (RULE 26)**



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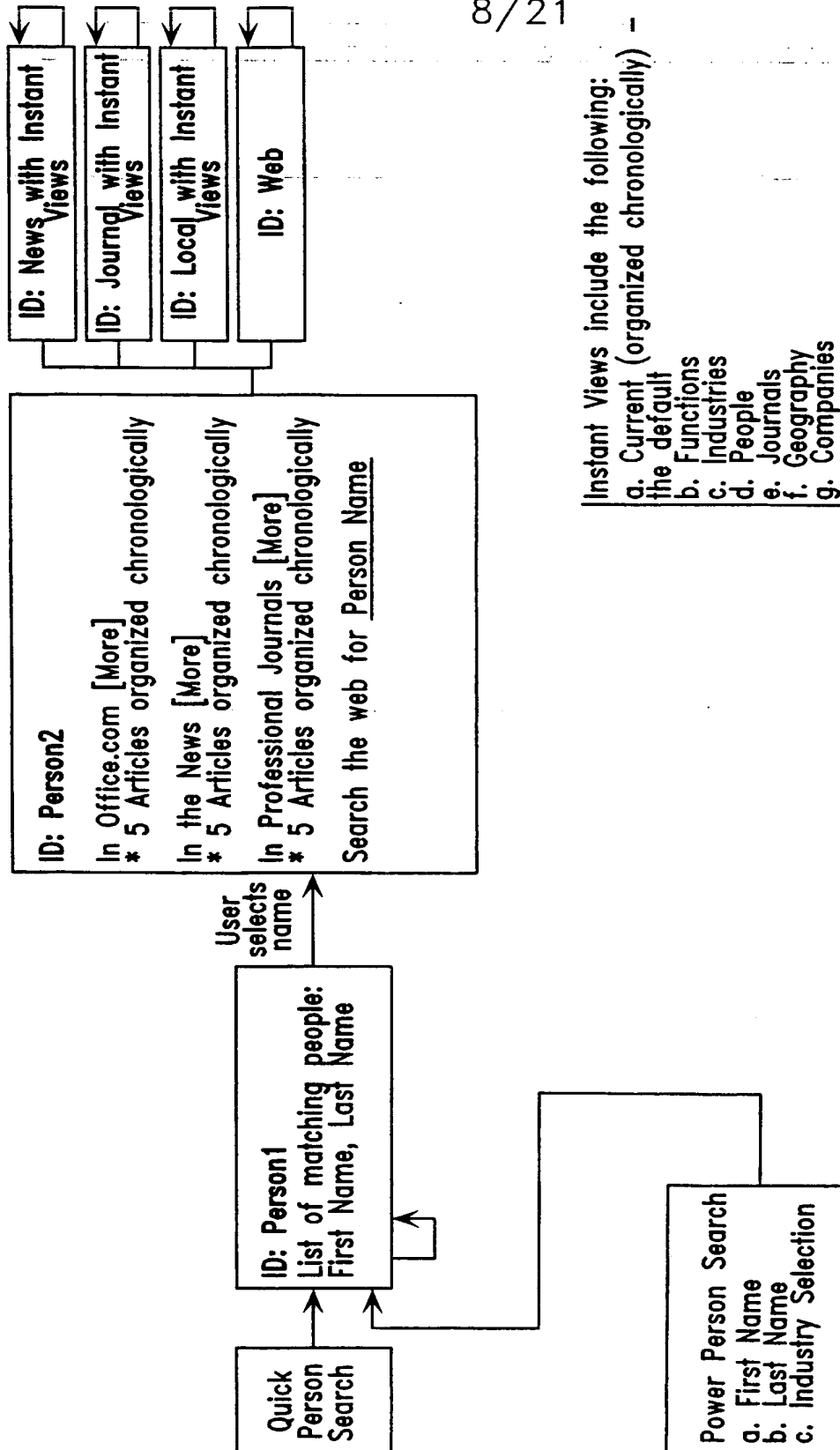
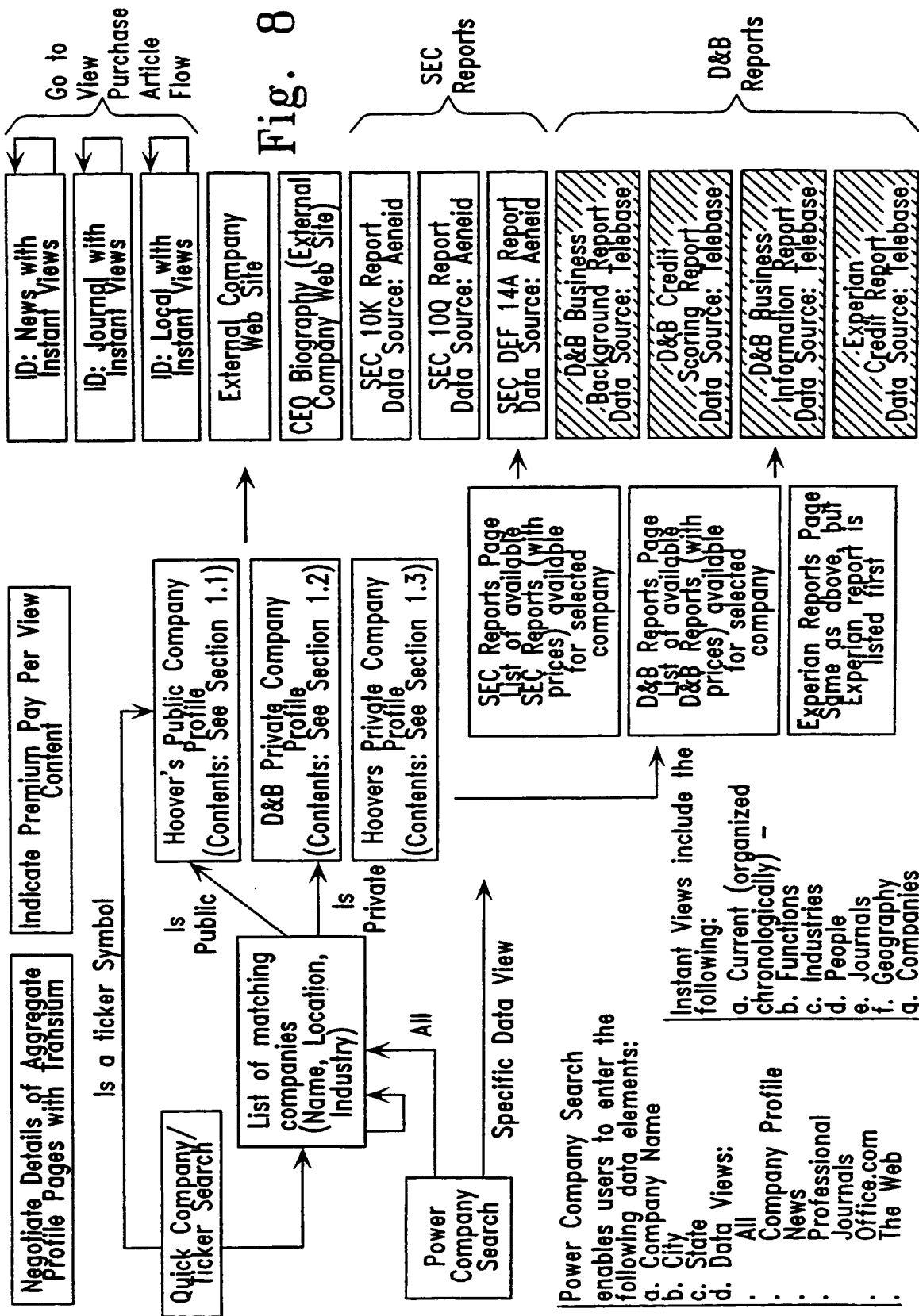
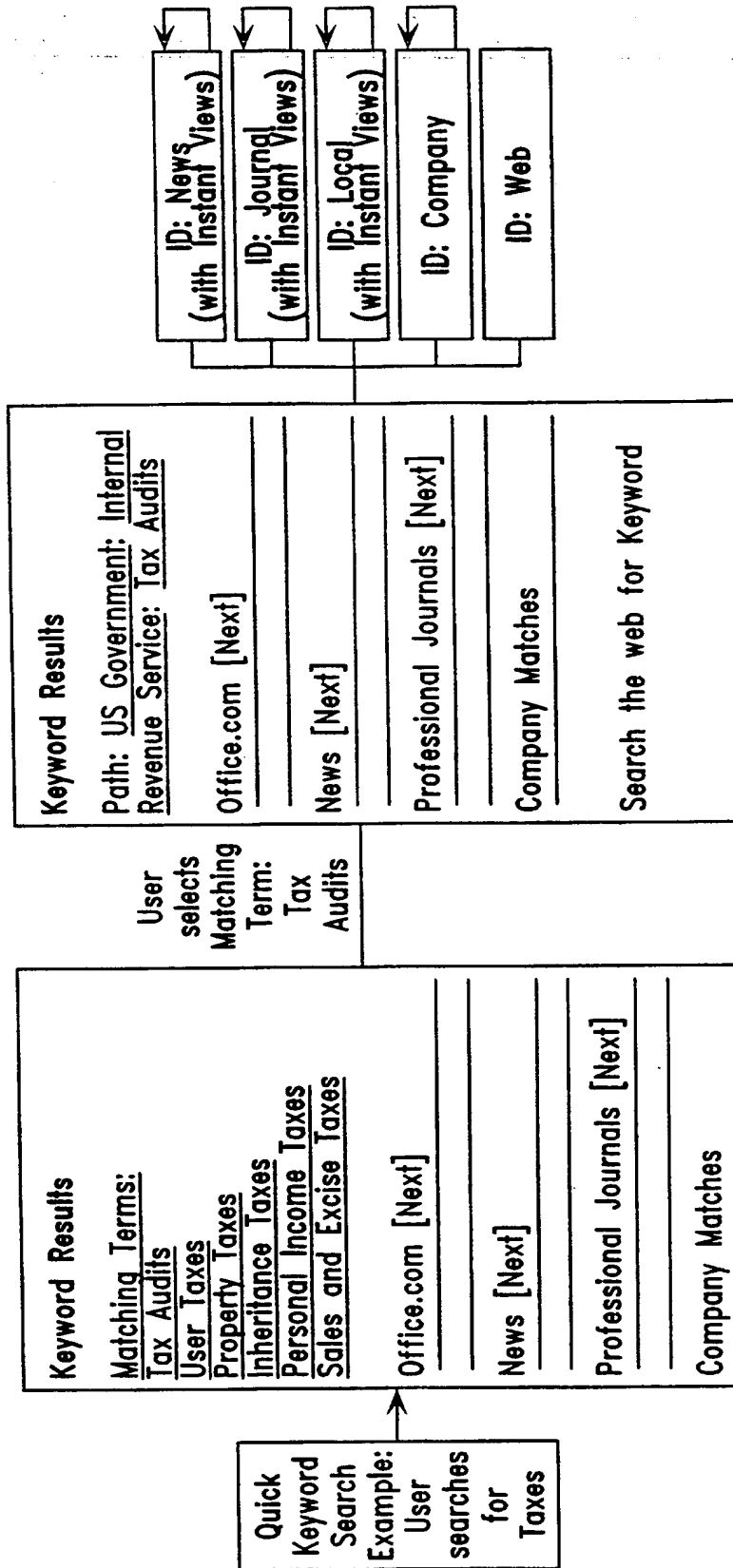


Fig. 7

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Question: What happens when the user clicks on a taxonomy term, and there are 0 results?

Fig. 9

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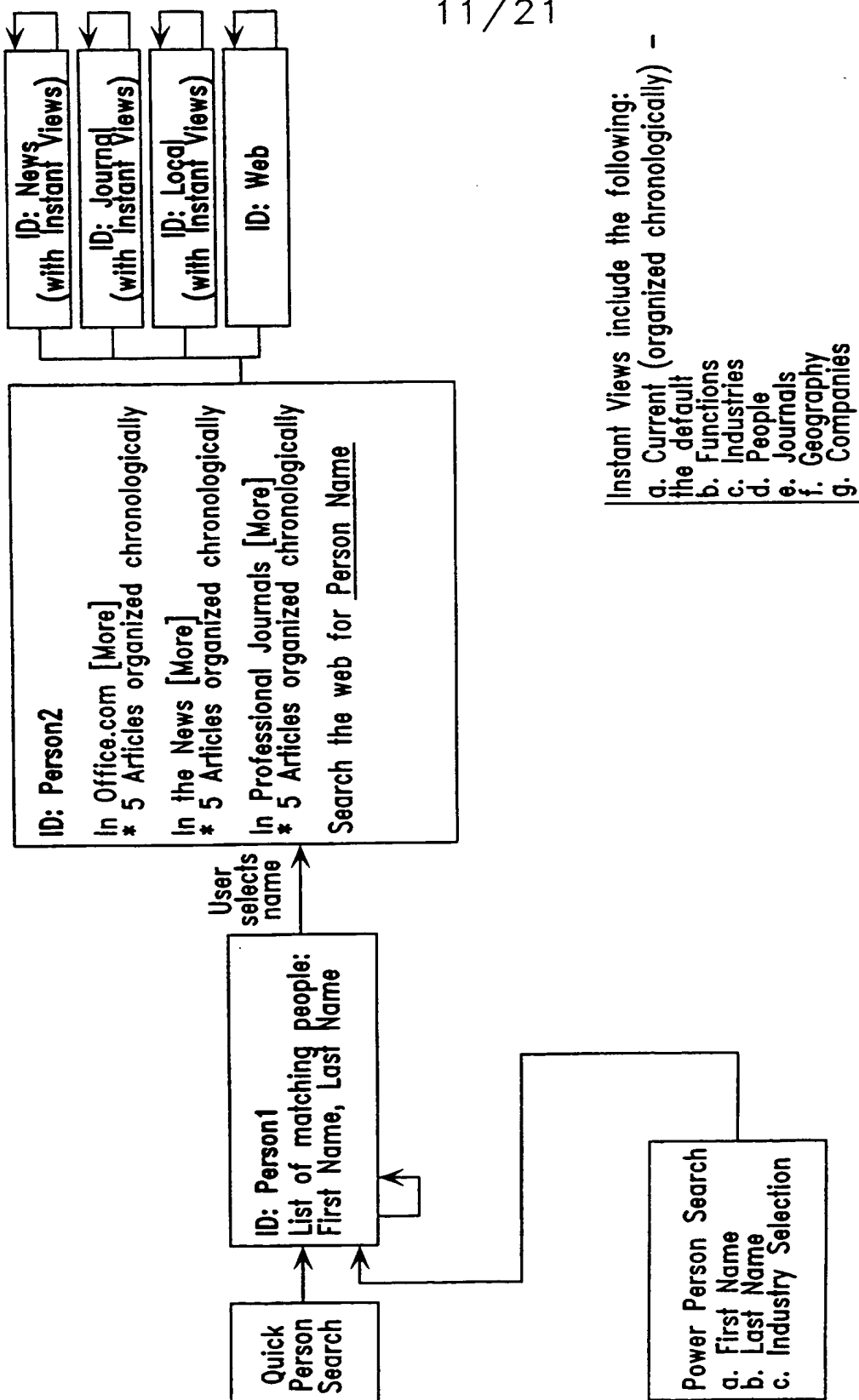


Fig. 10

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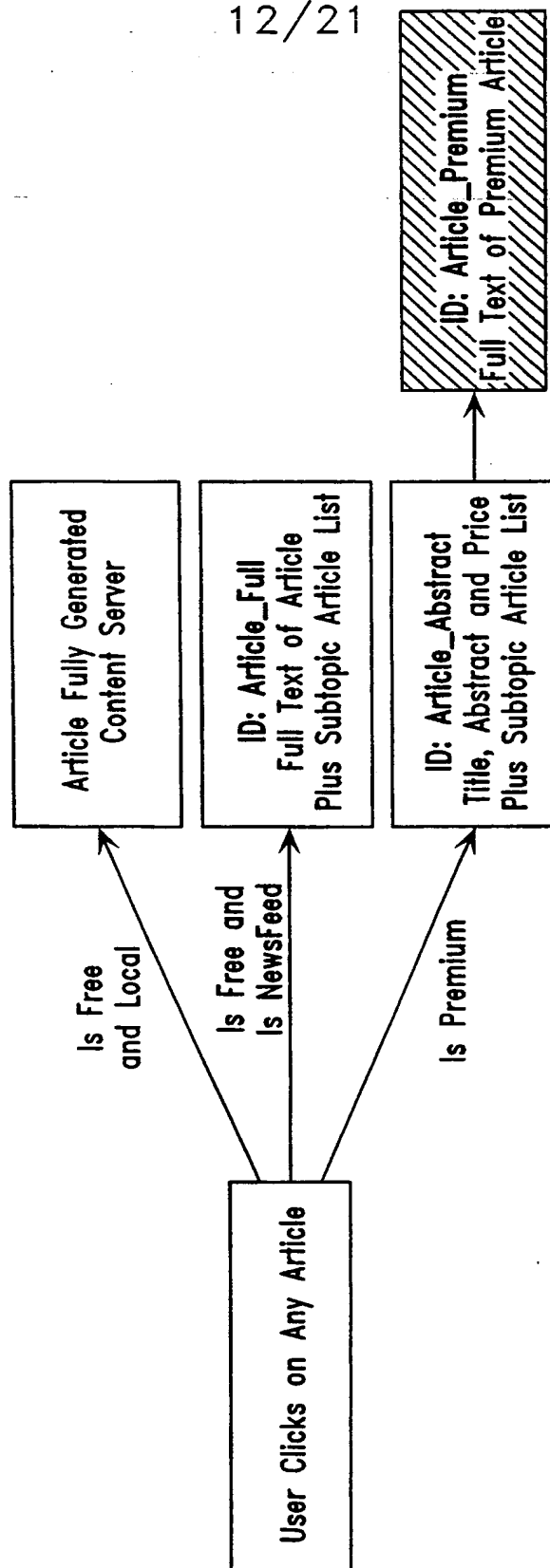


Fig. 11



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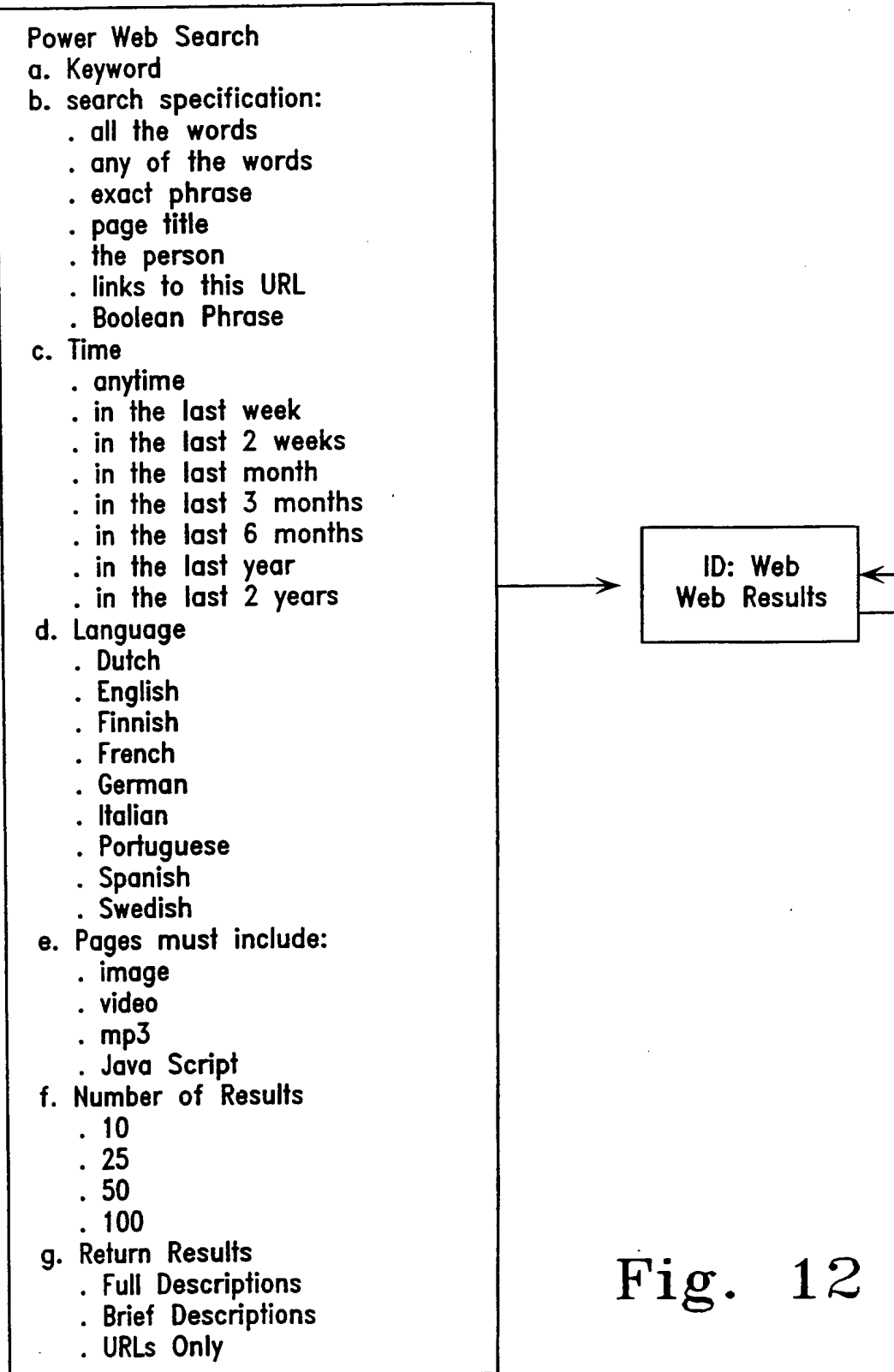


Fig. 12

Fig. 13A

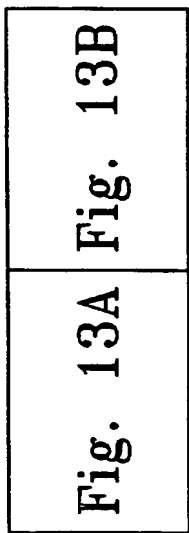
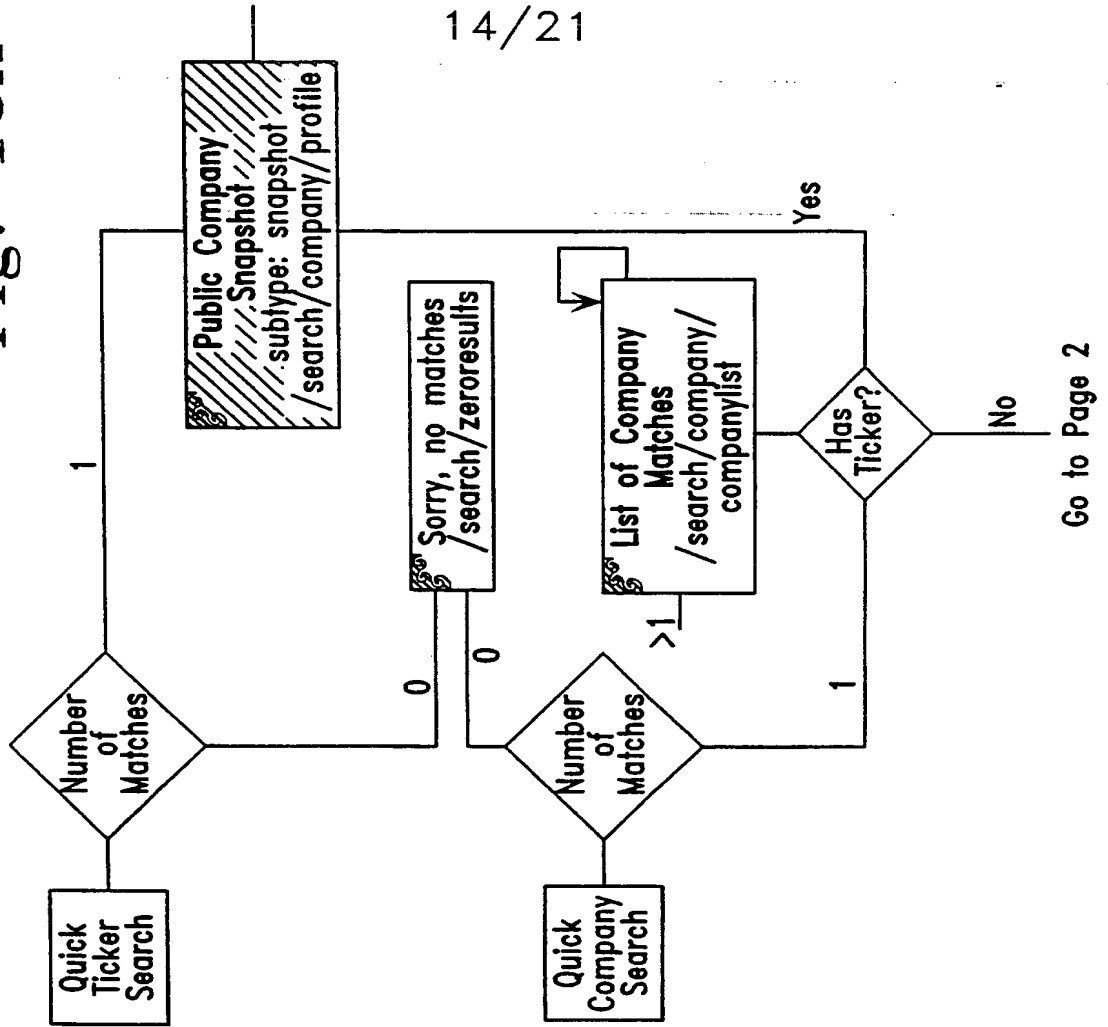
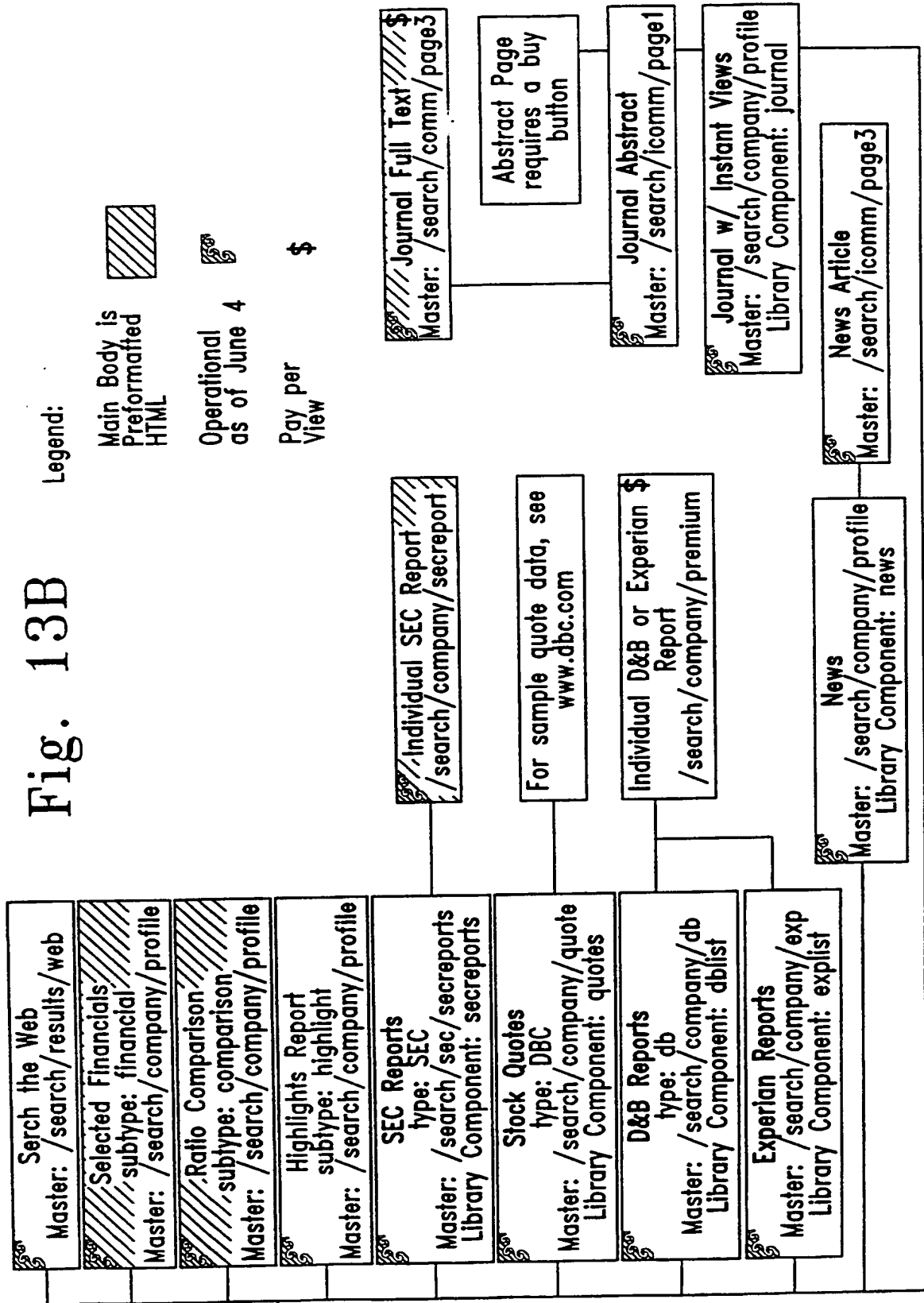
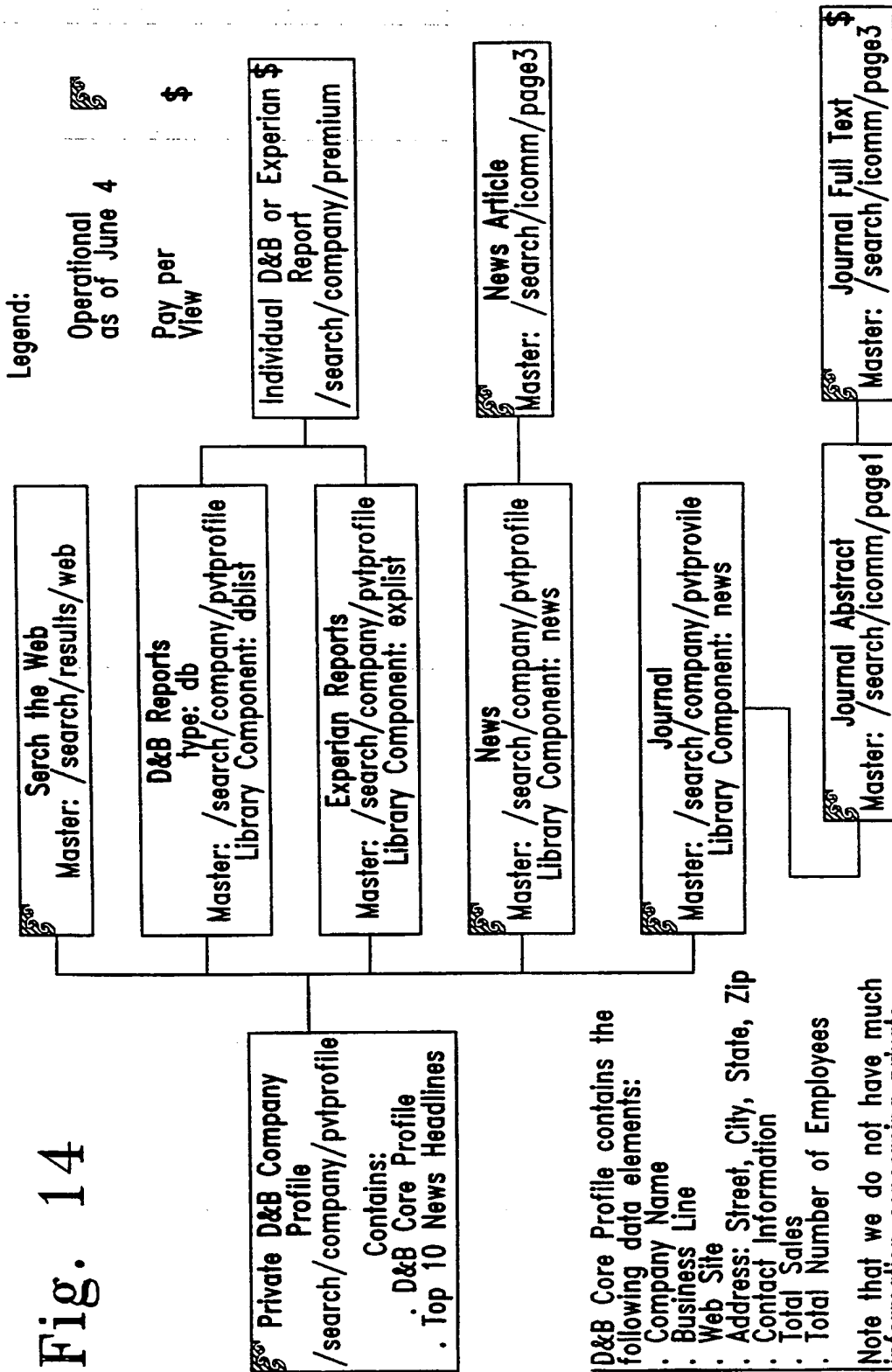


Fig. 13

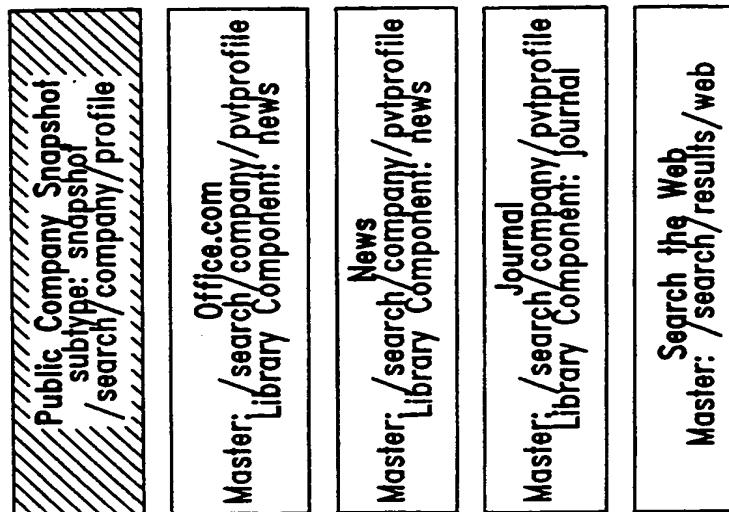
Fig. 13B



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List of Company  
Matches  
/search/company/companylist

Power Company Search  
enables users to enter any  
of the following search fields:

- a. Company Name
- b. City
- c. State
- d. Data Views:
  - Company Profile
  - News
  - Professional Journals
  - Office.com
  - The Web

Fig. 15

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Office.com	<div data-bbox="513 243 1281 1329"><p>Result for: "DOE"</p><p>Match: 49 11~20 of 49 &lt;&lt;Previous Page Next Page&gt;&gt;</p><ul style="list-style-type: none"><li>. Bill DOE</li><li>. Melinda DOE</li><li>. Ethan DOE</li></ul></div> <div data-bbox="513 1329 1281 1829"><p>Dynamic HTML Menu</p></div>
------------	--

Fig. 16

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Office.com	<div data-bbox="511 315 690 1333"> <p>Result for: "A"</p> <p>Match: 49 11-20 of 49 &lt;&lt;Previous Page Next Page&gt;&gt;</p> </div> <div data-bbox="592 1459 649 1837">Dynamic HTML Menu</div> <div data-bbox="787 451 1169 1333"> <ul style="list-style-type: none"> <li>. Company Name, Line of Business (City, State)</li> <li>. Company Name, Line of Business (City, State)</li> <li>. Company Name, Line of Business (City, State)</li> <li>. Company Name, Line of Business (City, State)</li> <li>. Company Name, Line of Business (City, State)</li> <li>. Company Name, Line of Business (City, State)</li> <li>. Company Name, Line of Business (City, State)</li> <li>. Company Name, Line of Business (City, State)</li> <li>. Company Name, Line of Business (City, State)</li> </ul> </div>
------------	--

Fig. 17

Office.com	
<div>Dynamic HTML Menu</div> <div><div>Pull Down Menu:</div><div><div>. Snapshot</div><div>. Quotes</div><div>. News</div><div>. Journal Articles</div><div>. Highlights Report</div><div>. Ratio Comparison Report</div><div>. Selected Financials</div><div>. SEC Filings</div><div>. *D&amp;B Reports</div><div>. *Experian Credit Report</div></div></div>	<div>A Corporation</div> <div>NASD: AAAC</div> <div>Industry: Software &amp; Programming</div> <div>HTML Report</div>

Fig. 18



Office.com	
Dynamic HTML Menu	<p>B Corporation</p> <p>All other date elements here.</p> <hr/> <div> <p>Top News:</p> <p>Match: 49 11-20 of 49 &lt;&lt;Previous Page Next Page&gt;&gt;</p> <ul style="list-style-type: none"> <li>. Headline #1</li> <li>. Headline #2</li> <li>. ....</li> <li>. Headline #10</li> </ul> </div>
<p>Pull Down Menu:</p> <ul style="list-style-type: none"> <li>. News</li> <li>. Journal Articles</li> <li>. D&amp;B Reports</li> <li>. Experian Credit Report</li> </ul>	
E. Zero Matches Template	
F. Zero Matches	

Fig. 19

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International Bureau



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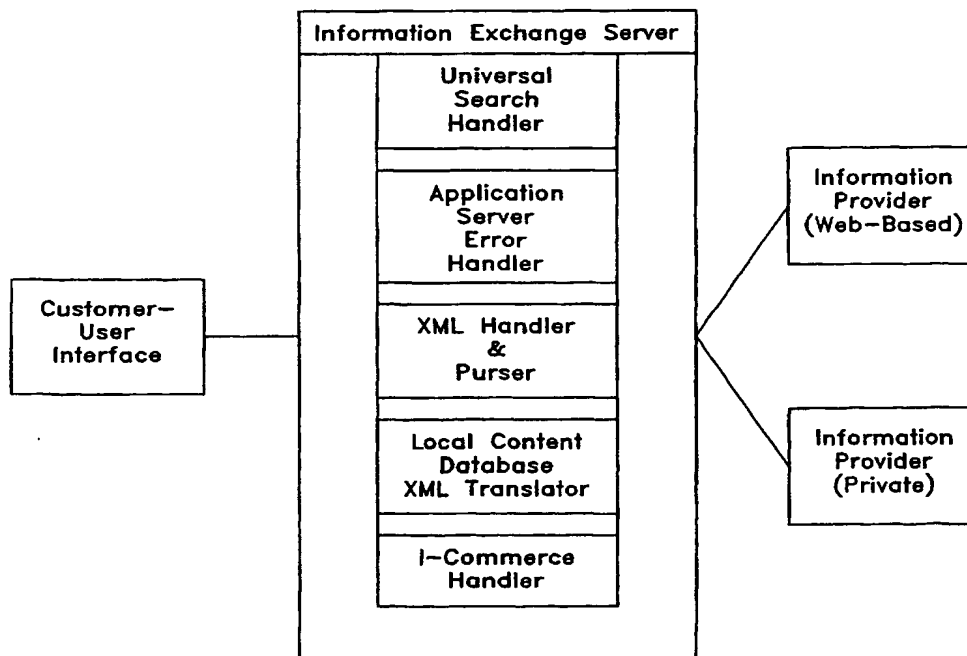
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[Continued on next page]

(54) Title: **SYSTEM AND METHOD FOR CONDUCTING AND COORDINATING SEARCH QUERIES OVER INFORMATION EXCHANGE NETWORKS AND PRIVATE DATABASES**



(57) Abstract: A system and method for conducting and coordinating search queries over information exchange networks, such as the Internet, and in particular, the invention provides a system and method for a consumer-user to submit a search query to a single information exchange server to obtain information from a plurality of the databases of information providers.

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**Published:**

— with international search report

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/17807

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IPC 7 G06F17/30

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data, IBM-TDB

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DWYER P A ET AL: "Some Experiences with a Distributed Database Testbed System" PROCEEDINGS OF THE IEEE, US, IEEE. NEW YORK, vol. 75, no. 5, May 1987 (1987-05), pages 633-648, XP002110503 ISSN: 0018-9219	1,2,4,14
Y	page 633, left-hand column, line 13 -page 634, left-hand column, line 2; figures 1,2	5-9,11
X	EP 0 625 756 A (HUGHES AIRCRAFT CO) 23 November 1994 (1994-11-23) column 7, line 31 -column 11, line 47; figures 1,2	1,3,10
X	WO 90 08360 A (TELEBASE SYSTEMS INC) 26 July 1990 (1990-07-26) page 5, line 14 -page 8, line 1; figure 1 -/-	1,7

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"&" document member of the same patent family

Date of the actual completion of the international search

5 October 2000

Date of mailing of the international search report

12/10/2000

Name and mailing address of the ISA

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Fax: (+31-70) 340-3016

Authorized officer

Deane, E

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/17807

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 294 134 A (LEA EDWARD) 17 April 1996 (1996-04-17) page 7, line 1 -page 15, line 20; figure ----	1
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